

REMARKS

Claims 27-54 are active in this application. In Applicants' response filed on January 17, 2003 there were two claims inadvertently numbered 43. Thus, the second Claim 43, i.e., Claim 43(2) has been cancelled and re-presented as Claim 54. Support for the amendments to the claims is found in claims 1-26 and the specification as originally filed. No new matter is added.

Applicants wish to thank Examiner Chakrabarti for the courteous discussion granted to the Applicants' undersigned representative on May 12, 2003. The substance of this discussion is reflected in the following remarks.

The present invention is not described in the prior art cited by the Examiner because this prior art does not describe *the deposition of a resin layer* that then allows for the formation of a structured substrate comprising a plurality of microcavities or a method of forming the same. The following discussion will explain in more detail these differences.

The rejection under 35 U.S.C. § 102(b) over Teoule (U.S. patent no. 5,837,859)

Teoule describes depositing pyrrolic copolymers on the surface of a working electrode. Teoule does not describe depositing a resin that can be used for the formation of a structured substrate comprising a plurality of microcavities. This explicit difference alone illustrates the fact that Teoule does not anticipate the present claims. Additional differences that further differentiate the present invention are discussed below.

Teoule describes submerging an electrochemical arrangement of electrodes in a solution comprising two different pyrrole monomers (A and A'). This electrochemical arrangement comprises a working electrode (1), a counter electrode (2), and a reference electrode (3) (Figure 4a). Teoule describes three different working electrodes: a standard electrode (col. 9, lines 36-52; Figure 4a), a microelectrode embedded in a glass cylinder (col. 13, lines 35-45; Figure 11a), and an ultra-microelectrode, which is adhered to a silicon

substrate (col. 14, lines 31-47; Figure 12). Upon application of an electric potential between the working electrode and the counter electrode, the pyrrole monomers become oxidized (col. 10, lines 3-7), which results in rapid copolymerization (Figure 4b). Since the pyrrole copolymer is insoluble, it is deposited upon the surface of the working electrode (Examples 2, 5, and 6). Using the pyrrole copolymer as a functionalized layer, Teoule is able to add different reagents that impart varying biosensing capabilities. However, Teoule's electrochemical arrangement is limited in that there is no way to expose the individual working electrodes, and thus functionalized pyrrole copolymers, to different reagents (e.g., oligonucleotides, oligopeptides, antigens, etc.) at the same time. Thus, Teoule must use multiple steps employing individually addressable working electrodes in order to produce different "blank biochips" on different working electrodes. This is different from the present invention, wherein this process can occur simultaneously.

As noted above, an obvious distinguishing feature of the present invention is the resin layer, which is deposited on the layer; where it can be patterned to form a plurality of microtroughs, which gives rise to a structured "blank biochip."

In addition, in Teoule's system, there is no way to physically isolate the working electrodes from the bulk solution. However, the present invention comprises a structured arrangement that provides microtroughs, wherein the individual "electrodes" can be isolated from one another. The microtroughs may either be exposed to the bulk solution or be individually filled with differing chemical reagents, using micropipetting or ink jet techniques. This is described in the present specification on p. 10, line 31 through p. 11, line 7.

Another difference is found in the fact that Teoule does not have an "active layer," whereby pyrrole monomers may self-assemble prior to oxidation and then copolymerization. Teoule's system comprises an electrode contained within or deposited on a substrate.

Activation occurs only by the application of an electric potential. The “active layer” in the present invention provides a means, whereby appropriately derivatized pyrrole moieties may self-assemble prior to either oxidation or cross-linking.

Another difference is that Teoule can only provide indirect functionalization sequentially, but Applicants’ invention provides the possibility to perform functionalization simultaneously (see p. 11, lines 13-17 of the present specification).

Finally, another difference is that Teoule’s system does not possess a layer of resin material that upon derivatization results in the formation of microtroughs. Applicants’ invention requires that a resin material be deposited on a layer (see Claim 27).

Derivatization, for example by photo-nanolithographic techniques, results in the myriad formation of microtroughs (p. 13, lines 28-33 and Figure 5 of the present invention).

In sum, it is clear that the present invention is different from the Teoule disclosure and as such Applicants request that this rejection be withdrawn.

The rejection under 35 U.S.C. § 102(b) over Livache

The present invention is also not described in Livache. Livache describes a process that is similar to Teoule rather than Applicants’ invention. Most importantly, Livache does not describe using a resin, in conjunction with a layer, to form a structured “biochip” comprising microtroughs. Livache describes “microelectrodes,” but these are more similar to the system described in Teoule rather than to Applicants’ system.

As a result, the present claims cannot be anticipated by the Livache disclosure and therefore, Applicants request withdrawal of this ground of rejection.

The rejection of Claims 32, 47, and 48 under 35 U.S.C. § 103(a) over Teoule and Livache

For the reasons detailed above, Livache nor Teoule describe structuring a biochip with a layer of material forming microtroughs and not describe using a resin, in conjunction with a layer, to form a structured “biochip” comprising microtroughs as provided in the present claims. Therefore, combining these two disclosures does not and cannot provide any basis for supporting a *prima facie* case of obviousness. Therefore, withdrawal of this ground of rejection is requested.

The rejection of Claims 35-36 under 35 U.S.C. § 103(a) over Teoule and Simon

The Examiner has relied upon Simon to provide N-(3-trimethoxysilyl)propyl pyrrole as a silanization agent. However, even when Teoule is combined with Simon there is no description or suggestion for structuring a biochip with a layer of material forming microtroughs and using a resin, in conjunction with a layer, to form a structured “biochip” comprising microtroughs as provided in the present claims. Therefore, combining these two disclosures does not and cannot provide any basis for supporting a *prima facie* case of obviousness. Therefore, withdrawal of this ground of rejection is requested.

The rejection of Claims 35-36 under 35 U.S.C. § 103(a) over Teoule and Lizardi

The Examiner has used Lizardi in order to teach gluteraldehyde as a cross-linking reagent. However, even when Teoule is combined with Lizardi there is no description or suggestion for structuring a biochip with a layer of material forming microtroughs and using a resin, in conjunction with a layer, to form a structured “biochip” comprising microtroughs as provided in the present claims. Therefore, combining these two disclosures does not and

cannot provide any basis for supporting a *prima facie* case of obviousness. Therefore, withdrawal of this ground of rejection is requested.

The rejection of Claims 35-36 under 35 U.S.C. § 103(a) over Teoule and Lizardi

The Examiner has employed Heroux to teach functionalizing an oligonucleotide with a thiol group. However, even when Teoule is combined with Heroux there is no description or suggestion for structuring a biochip with a layer of material forming microtroughs and using a resin, in conjunction with a layer, to form a structured "biochip" comprising microtroughs as provided in the present claims. Therefore, combining these two disclosures does not and cannot provide any basis for supporting a *prima facie* case of obviousness. Therefore, withdrawal of this ground of rejection is requested.

Applicants submit that the present application is ready for allowance. Early notice of such allowance is requested.

Respectfully submitted,

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